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COST AND EXPENSE.

In a recent paper*, I contrasted the use of the terms cost and utility in the theory of prosperity with their use in the theory of value. The relation of cost to utility however, cannot be fully understood until the relation of cost to expense is explained. In the theory of value, the use of the terms cost and expense is such that two distinct concepts of production are confused with each other, and hence these terms are often used as synonyms, when they should have distinct ideas attached to them. A contrast of these terms and of the ideas they should convey must be made before the theory of prosperity can be clearly distinguished from a theory of value. I shall therefore complete my argument by presenting the subject anew from this point of view.

Cost is measured by the disagreeable exertion necessary for production. It is the sum of all those painful acts which reduce the vitality of the producer, and hence demand a certain compensation or relaxation to replace the producer in the condition he was before the act of production. Some simple acts of production in a primitive society will be undertaken by producers for their costs only. In an advanced society, however, an act of production demands of the producer more than mere painful exertion. It also demands sacrifice. Sacrifices differ from costs in that the former relate to acts of consumption while the latter relate to acts of production. Efficient production involves not only cost, but also changes, delays or losses in consumption, which together make up the sacrifices of production. These sacrifices are of many kinds. Often the producer must, to increase production, migrate from one county to another, or from

*Cost and Utility, *ANNALS OF THE AMERICAN ACADEMY*, January, 1893.

country to city, and then a change in many forms of consumption is demanded, new pleasures being substituted for those most cherished in the old home. The sacrifice of confinement through which the producer loses the pure air and invigorating conditions of outdoor life, as well as many of the free goods of nature, is another example of the losses in consumption which efficient production demands. The act of abstinence is also a form of sacrifice which compels some consumers to delay their consumption in order that other producers may have the necessities needed to make their labor more productive.

For efficient producers however the most prominent form of sacrifice results from the increasing demand for more time in which to produce and to consume. The time needed for consumption cuts in on the time demanded for production. There is on the one hand a tendency to work longer when labor becomes more efficient, and on the other, when a greater sum of utilities is produced, more time is required to get the maximum pleasure from its consumption. There is, therefore, an antagonism between the demands of production and of consumption for the time of the producer. The resulting compromise compels him to reduce the time devoted to consumption and thus to lose some of the utility of the articles he has produced. If more than a certain quantity of goods is consumed in an hour's time, the additional goods do not give that amount of utility to the consumer which they would yield if he had additional time for their consumption. A dinner, for example, yielding one hundred units of pleasure if an hour's time were given to it, might not yield more than eighty units if only forty-five minutes were taken, while the total pleasure might be less than sixty units if the time were reduced to one-half hour.

This compressing of the consumption into so short a period of time that the maximum pleasure cannot be derived from it, I shall call *the interference in consumption*, since the consumption of one commodity under these conditions

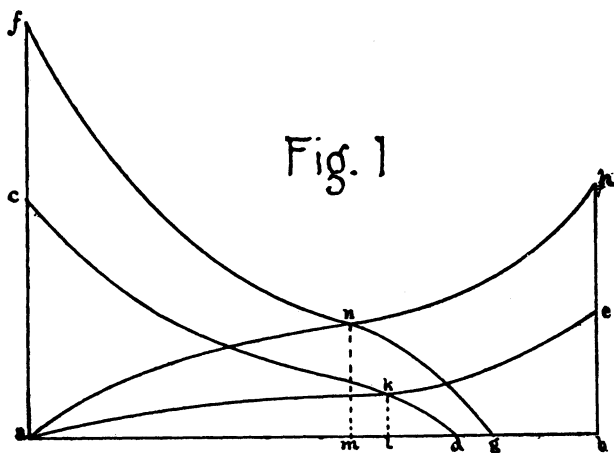
interferes with the complete utilization of the others. All kinds of sacrifice involved in production are really varieties of interference in consumption and I shall use the two terms as synonyms. The sacrifice of confinement, for example, compresses the enjoyment of nature's free goods to a shorter period each day, heightening the pleasure of this shorter period but reducing the total utility. Abstinence also may be viewed as an act confining the enjoyment of certain goods to a future time so that the present may be utilized more fully for production. We can always increase the pleasure of the present goods consumed during a given period if we neglect the production of future goods. Present production therefore interferes with present consumption and the enforced delay of the latter reduced the utility of the goods.

Producers endure as I have said, cost and sacrifice: To consumers, however, all outlay is expense—the giving up of one utility to secure another. Each party to an exchange has already produced or at least possesses certain goods, and needs other goods which some one else has produced or possesses. He measures the goods he receives not through the cost of the goods to their producer, but through the utility to him of the goods he has parted with. Expense is equal to the utility of the goods parted with in exchange for other goods. What the producer loses in the act of production is his cost; what he gets in exchanging his product for other goods is his reward. Expense should therefore be associated with reward for labor and not with the cost of the producer. The reward of the producer is equal to the sum of his costs and sacrifices. The reward increases, as costs are reduced, because a high reward indicates relatively low costs. But sacrifice grows in proportion to the increase of the reward and hence the two—cost and sacrifice—always make up a sum equal to the reward at the margin of production.

Sacrifice relates to consumption and is the result of the interference in consumption. Though it is not a source of

pain when fully compensated for, it is measured by producers in terms of cost, and has the same effect on expense as if it were a cost. Real costs are units of pain and their quantity is independent of the utility of goods to consumers. But the sum of sacrifices grows not with cost but as cost is reduced. It depends upon the utility that consumers get from the margin of their consumption and increases or decreases as this margin rises and falls. While therefore it is possible to measure the expense of commodities either in terms of utility or of cost, it must be kept in mind that expense grows greater or less, not as cost increases or decreases, but as the margin of consumption rises and falls.

The difficult part of this analysis consists in seeing that sacrifices, although measured in terms of cost, really depend upon and vary with the margin of consumption. I shall endeavor to make my meaning clearer by using a diagram.



Let the quantities of goods produced and consumed in a day be measured along the line $a b$. I shall assume that the whole day, equaling $a b$, is limited to sixteen hours, the other, eight being used for sleep, need not be considered.

Let the surplus utility of the first unit produced be measured along the line af , the surplus of this increment being equal to the line ac . Let, also, a line be drawn from c to d on the line ab , so that the area acd will show the total surplus of the day's work. The distance of each point in the line cd from the line ab will measure the surplus of that increment of commodity. Production must cease at d because there would be no further inducement to work. I do not measure the cost or total utility of the product of the day's work because my argument does not depend upon either. Surplus, it should be remembered, is the difference between cost and total utility.

If we further assume that the line ad represents twelve of the sixteen hours allotted to production and consumption, the consumption of the goods produced would be crowded within the limits of the four remaining hours. When the producer works twelve hours he loses much by the interference in his consumption. Many free utilities would be given up and other utilities could be but partially enjoyed. To measure this loss the line ae can be drawn so that at any point its distance from the line ab will indicate the loss in consumption involved in giving that portion of the time to production and thus compressing the consumption within narrower limits of time. In the first hours of working this loss would be slight, but it would gradually increase as the day advances and in the closing hours it would be very great. If the whole sixteen hours were given to production and the consumption of goods forced over into the remaining eight hours usually given to sleep, the loss would be measured by the area abe .

Under these conditions the working day would not be extended through twelve hours, although production would give a surplus during that time. If the working day were of that length the producer would get no compensation for the utility he loses through the interference in his consumption due to the reduced time left for consumption. He would

have a return for all his costs, but none for his sacrifices. The working day would, therefore, be shortened until the surplus of the last increment of production would compensate the producer for his sacrifices. The normal length of the working day under these conditions would be fixed not by the place where the lines $a b$ and $c d$ cross, but by the intersection of the lines $c d$ and $a e$. If the line $a l$ is five-eighths of the line $a b$, the day's work would be shortened from twelve to ten hours and the marginal cost of the producer would be less than the margin of his consumption by the amount measured by the line $k l$.

Let us further suppose that the productive power of society is increased so that the surplus of the first increment of production equals the line $a f$, and that the working day during which the producer can get a surplus for his work is extended from twelve to thirteen hours. If g is the point of no surplus under the new conditions, the distance from the various points in $f g$ to the line $a b$ will indicate at each point the surplus of the corresponding increment of production, and the figure $a f g$ will measure the whole surplus under the new conditions. But with the increase of the surplus the interference in consumption will also increase. There will be more to consume at any given portion of the day after production has begun and the sacrifice involved in crowding the whole consumption within a given time will be greater. The day must, therefore, be divided differently from what it was before the productive power was increased, and a relatively longer period must be given to consumption. If the area $a h b$ measures the interference in consumption after the increase of productive power in the way that $a e b$ measured it before the increase, the length of the new working day will be determined by the point n where the lines $f g$ and $a h$ intersect. The new working day will, therefore, equal the line $a m$ and be say nine instead of ten hours.

As the same line $m n$ measures both the marginal sacrifice and the marginal surplus, it may seem that there is no

advantage in distinguishing sacrifice from cost. Sacrifice is at least measured in terms of cost and together they determine the margin of production and the value of what is produced. If their sum decreases, the working day is prolonged, and if their sum increases the working day is shortened. Why make a distinction which seems more technical than real?

The difference between cost and sacrifice becomes of importance even in the theory of value, when the effects of the distribution of wealth are considered. Costs, I have shown, are determined by the conditions of production and must be borne by the actual producer. They grow greater or less with each change in the productive power of society. Their amount cannot be changed without a change in the conditions of production. No producer will work for less than the cost of his labor. Costs, therefore, form a barrier below which the return of the producer cannot fall, thus fixing the limit to the changes in objective values through which the distribution of wealth is effected.

Sacrifices, however, depend not on an act of production, but on having certain goods to enjoy which must be given up to extend production. The extra expense of the purchaser of goods above their real cost varies with the amount of consumable goods that the producer has when the new production is to begin. There can be no interference in consumption unless the producer already has a quantity of goods at his disposal, and the greater the quantity of these goods, the greater the interference.

It follows from this reasoning that the quantity of sacrifice demanded of a producer varies with his income, and if his income is reduced through a more unfavorable distribution of wealth the quantity of sacrifice demanded of him is reduced. Sacrifices, alone, form no barrier to the reduction of income. They grow less as the income decreases and would fall almost to zero (overlooking free goods) if an unfavorable distribution of wealth reduced the value of the

goods produced to their real costs. Even the free goods can be monopolized and the producer shut out from their enjoyment without any reaction in the downward tendency of the value of goods produced solely by labor.

Costs alone form an irresistible barrier to the fall of objective values separate from the conditions determining the distribution of wealth. They are a part of the conditions of the individual workman and cannot be separated from him. Sacrifices, however, depend upon the general social conditions and vary with them. The ultimate cause of the increase or decrease of sacrifice is out of the control of the individual workman. It depends upon the distribution of that portion of the income of society, the shares in which are determined for the various factors in production by their relative rates of increase.

In our diagram, for example, after the increase of productive power by which the surplus of society is increased by the area lying between the lines cd and fg , the sacrifice of producers is also increased by the area lying between the lines an and ak , if this increased surplus is given to the same persons who bore the costs. This distribution of the additional surplus may not take place. Suppose that certain monopolies increased their profits to such an amount that they absorbed all of the results of the increase of productive power. Then the surplus of the producers would be exactly what it was before the improvements in production, and hence their sacrifices would also be unchanged. The sacrifices would still be measured along the line ae , and the surplus enjoyed by the producers would be measured along the line cd . The length of the working day would be determined by the point of intersection of the lines cd and ae , and the workman would work ten hours instead of nine, as would be the case if they received the whole of the benefit of the improvements in production.

The increase of sacrifice depends not on the increase of productive power, but on the distribution of the surplus.

Sacrifice is not, therefore, a safeguard against a fall in the value of goods, nor against a decrease of income, except in so far as the loss of income will affect the relative rate of increase of the workmen. A part of the subjective value of each increment produced equal to the marginal cost of production has its distribution fixed by the marginal costs of producers. The distribution of this part cannot be altered without some change in the cost of production. Another part of subjective values is measured by the difference between the marginal cost and marginal utility of the final increment of production. The distribution of this part is independent of the condition of the individual producer, and depends upon the relative rates of increase of the various factors of production. The most slowly increasing factors get the largest shares, and hence this part of the surplus may be called the monopoly fund, the law of its distribution being a law of monopoly and not of cost. The quantity of sacrifice is determined by the distribution of this fund. Whoever gets the fund increases his sacrifices through the increase in the interference in his consumption which the additional consumption creates.

It is therefore the relative rates of increase of producers which determine whether their sacrifices are a barrier against a fall in the objective value of the goods they produce. If they are one of the slowly increasing factors, they may be sure that their share of the surplus will not be reduced, and hence their sacrifices will be a check to the fall in the value of the goods they produce. But under other conditions, when their rate of increase is relatively large, their sacrifices will be of no avail in preventing a reduction of income through a fall in the value of what they produce. Sacrifice as a cause of value fails where its aid is most needed, and is efficient only where other causes will produce the same results.

The effect of this sacrifice or interference in consumption shows itself most clearly in international trade. The

well-known doctrine of Ricardo makes international trade an exception to the general law that value depends upon cost of production. The exchange of commodities between nations, it is said, is determined by their relative and not by the absolute cost of production. Trade may exist between countries although one of them can produce all the articles exchanged with less labor than the other.

Foreign trade, however, is no exception to the general law that the expenses of production determine the value of commodities. The apparent exception is due to the fact that, in foreign trade, cost is used in the sense of disagreeable exertion, while in domestic commerce it is made to include both the cost due to disagreeable exertion and the sacrifice due to interference in consumption. Two elements are thus added which vary inversely to each other. As cost decreases and reward for labor increases, the interference in consumption grows, and the expense of buying commodities is relatively greater.

The reason why values in foreign exchange are not proportional to costs is that the interference in consumption is not the same for nations with different degrees of productive power. When the expense due to this interference in consumption is added to the real costs of production, it will be seen that the same law holds in foreign as in domestic exchange. Suppose nation *A* can produce a pound of sugar for three units of cost and a pound of coffee for four units of cost, while nation *B* can produce a pound of sugar for two units of cost and a pound of coffee for three units of cost. Nation *B* therefore has the advantage in the production of both articles, and yet a trade will arise between them. How can it be explained? Nation *B* has the best environment, and hence, as the return for labor is more abundant, the interference in consumption will be greater. We will assume that in *B* the relation of cost to sacrifice (the interference in consumption) is as one to one, while in *A*, where the environment is not so good, the relation of cost to sacrifice

is as five to two. The following table will show the relation of cost to expense for the two articles in the two nations :

	COST.		EXPENSE.	
	<i>A.</i>	<i>B.</i>	<i>A.</i>	<i>B.</i>
Sugar, . . .	3	2	$4\frac{1}{2}$	4
Coffee, . . .	4	3	$5\frac{1}{2}$	6

Sugar in *A* has a cost of 3 units a pound, and the sacrifice will equal $1\frac{1}{2}$ units ($\frac{1}{2}$ of 3). The expense will be $4\frac{1}{2}$ units. Coffee in *A* costs 4 units a pound; the sacrifice is $1\frac{1}{2}$ units and the expense is $5\frac{1}{2}$ units. Sugar in *B*, however, costs 2 units a pound ; the sacrifice equals 2 units also, and the expense is 4 units. Coffee in *B* costs 3 units a pound ; the sacrifice is 3 units and the expense is 6 units. In *A* the expense of sugar would be $4\frac{1}{2}$ units, and in *B* 4 units a pound ; while in *A* the expense of coffee is $5\frac{1}{2}$ units, and in *B* 6 units a pound. The expense of buying sugar will be less in *B*, and the expense of coffee less in *A*. It will therefore be an economy of expense for both nations to buy their sugar in *B* and their coffee in *A*, and the people of *B* will gain by this trade although the real cost of producing coffee is less in *B* than in *A*.

In the same way it can be shown that the general law of value applies when exchanges take place between different classes in a given nation, forming what Cairnes calls the non-competing groups. The higher classes produce given commodities at less cost than the lower classes, yet because of the better environment due to superior intelligence the interference in their consumption is much greater. If we add compensation for this greater interference in consumption to the real cost of production, the expense of the commodities they produce can be determined, and in a like manner the expense of the articles produced by other classes can be fixed.

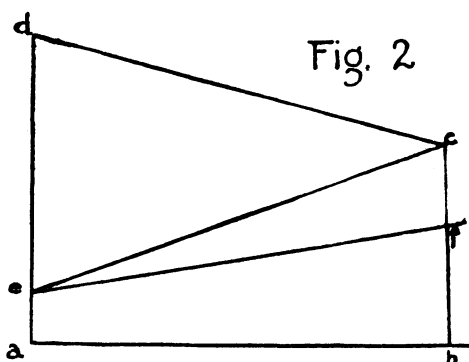
With this explanation, it is easy to see why each class in society is able to maintain itself in some industry in the complex organization of a modern society without creating

any exceptions to the general law of value. If the demand for the products of a given class fall off and their incomes are reduced, the smaller consumption reduces the interference in consumption. The sacrifice now being less, the sum of sacrifice and cost is less, and hence the expenses of production are reduced until they are no greater than the value of the products of the class in question. If, however, the demand for the products of a given class increases and the income grows, the interference in consumption also increases, and thus the sum of sacrifice and cost becomes so great that the normal expenses of production are equal to the higher value of the goods produced. When the value first rises it appears to be a monopoly value purely; but the larger incomes creating additional interference in consumption soon raise the normal value so much that the monopoly element is lost sight of. Each class therefore regards its income as just, and imputes to the act of production a cost equal to the value of the goods produced. A close analysis will, however, show this estimate to be erroneous. The real costs are much less than the expenses of production. To make cost and expense equal, sacrifices are regarded as costs when they are really an index of prosperity. The greater the interference in consumption, the better the environment and the less the costs.

The normal expense of the goods produced by a given class of workmen cannot be determined until its relations to other non-competing classes are known. The relative rates of increase of these classes determine the distribution of a large part of the surplus. The relative share of each class in this part of the surplus determines the interference in its consumption and hence the amount of its sacrifice. The expenses of production, if a given class is to be employed, can now be known by adding the sacrifice to the real costs. In this way the influence of distribution on expense is made clear, and the law of value is stated in a way to which there are no exceptions.

The following chain of reasoning shows how value is connected with utility and cost. The margin of consumption determines the amount of cost and sacrifice, the latter increasing and the former decreasing as the margin rises. The sum of cost and sacrifice equals the expense of production and this expense fixes the value of commodities. We cannot, therefore, analyze and determine the value of commodities through a study of costs alone, thus making the theory of value independent of or an introduction to the study of other parts of political economy. The theory of value depends upon the theory of consumption and cannot be studied with profit until the latter theory is thoroughly understood.

I have shown that the expense of the consumer is measured by the reward of the producer. This reward is also equal to the sum of sacrifice and cost of the producer. Expense can, therefore, be measured in terms of cost, and thus the relation between cost and expense can be made clear. The following figure will aid in illustrating this relation.



If the quantity of goods produced be measured on the line $a b$, the estimates of the producer and consumer of these goods can be measured by vertical distances from this

line. From the standpoint of the producer the production of these goods involves cost and sacrifice. The cost of each successive increment is measured by the distance between the lines ab and ef while the sacrifice is measured by the distance from ef to ec . The reward necessary to call forth the productive act will be measured by the distance from ab to ec .

In the mind of the consumer, however, the contrast is between utility and expense. The pleasure derived from an article is compared with what he must lose to get it. He therefore measures his net utility by the distance from ab to dc and his expense by the distance from ab to ec . The line ec can be called the *expense line* as its location shows how much the consumer would have to give up in exchange for a given increment if the relation of supply and demand made it the marginal increment. Under these conditions the problem is to determine where production will cease, and why it will cease while a surplus yet remains to the producer in the final act of production.

From the standpoint of the consumer, the utility of each additional increment grows less and its expense grows greater until the two quantities are equal. The point c , where the lines ec and dc meet, indicates the place where the surplus to the consumer, due to the exchange, will be reduced to zero, and hence this point will mark the limit to production. As the expense of the consumer is measured by the reward of the producer, the line bc shows the maximum reward which the producer can secure. If production is continued beyond this point c the producer will still have a surplus, but it can not be greater and would soon be less than if production ceased at point c .

To show more clearly the motives which limit production at the point c I must again refer to a confusion found in economic reasoning resulting from the use of the word "utility" in different senses.* Utility in one sense of the

* See *Quarterly Journal of Economics*, Jan., 1893, page 182.

term measures the addition to the happiness of a person which the consumption of an article will give. This positive utility may be one, five, ten or more units, depending upon the amount and quantities of the article.

Utility may also be used in a negative way to denote the loss that a person would suffer if deprived of a particular portion of a commodity. In other words it is the power a given increment has to improve the condition of its possessor. Professor Clark calls this kind of utility "effective" utility, and I shall employ it in a more restricted sense to bring out more clearly one of the ways in which the term "utility" is used.

Positive utility is a direct relation between the consumer and a given commodity. The pleasure of its consumption is a fixed quantity which can be measured by its effects upon the consumer. Effective utility, however, is a relation between two commodities and the consumer. It is measured not by the total utility of each commodity, but by the excess of the utility of the one commodity over the other. If Article *A* gives twelve units of pleasure and Article *B* gives ten units and the consumer must choose between them, the effective utility of *A* is two units. The status of the consumer will be better by two units if he chooses *A* than if he chooses *B*, or in other words, if he loses *A* and substitutes *B* in its place, the sum of his utilities will be reduced by two units.

If, for example, a thirsty man comes to the bank of a river the positive utility of a cup of water will be great, but its effective utility will be zero. If this cup of water is thrown away, another cup will supply its place fully and he will suffer no loss. Suppose again that the consumer can supply his thirst by milk, beer or water. The effective utility of the milk and beer will not be as great as their positive utility. If the water gives four units of pleasure, and the milk or beer ten units of pleasure, the effective utility of the milk or beer will be only six units. They only add six units to

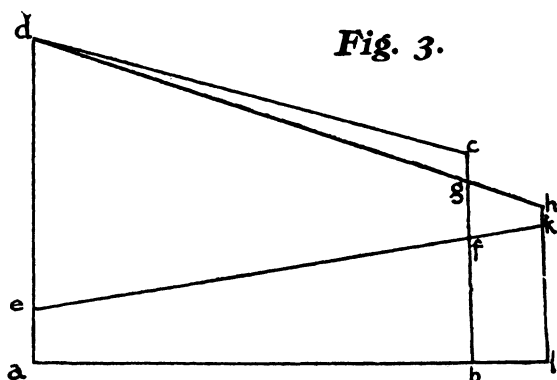
the welfare of the consumer beyond what the free water would add. Their value cannot exceed six units, although each of them has positive utility of ten units. Wherever, as in these cases, the consumer has a choice between isolated pleasures supplying the same want, the positive utility is greater than their effective utility, and often the positive utility is great where the effective utility is small or entirely absent.

This distinction is of importance also to producers. The positive utility of an opportunity to work is measured by the whole return for the labor expended. The effective utility of this opportunity is measured by the difference between the return from this opportunity and some other opportunity, which might be utilized if the first opportunity failed. If, for example, a man was in the midst of a fertile tract of unoccupied land, the effective utility of any portion of it would be zero. He would lose nothing if any one farm was taken away. Its positive utility, however, would be great, because the return for his labor would be large. On the other hand, the effective utility of a chance to work in a shirt factory may be very great to a poor woman with no other opportunity to work. Life or death may depend upon this one chance. The positive utility of this opportunity, however, is small since the return for labor is meagre.

The consumer views the act of exchange he is making with the producer from the standpoint of effective utility. He is comparing the relative utilities of two goods and values each increment by its effective utility alone, that is, by what he would lose in welfare, if he consumed what he gives up instead of what he gets in exchange for it. He ceases to exchange at c , in Figure 2, because no new commodities will add to his effective utility.

The producer, however, is interested both in the positive utility of what he produces and the effective utility of the opportunity for labor which he utilizes. His surplus is measured by the difference between the cost of what he

produces and its positive utility. He is well-off or poorly-off according to the size of this surplus. His inducement to continue work, however, depends not on the size of the surplus but on the effective utility of the next opportunity to labor. How much will this additional labor increase his well-being? To answer this question we must know more than what surplus it will give; we must also know what this time is worth to him as a consumer. Two surpluses must be compared—what he will secure by working, and what he will secure by a better utilization of what he has already produced or by enjoying free goods.

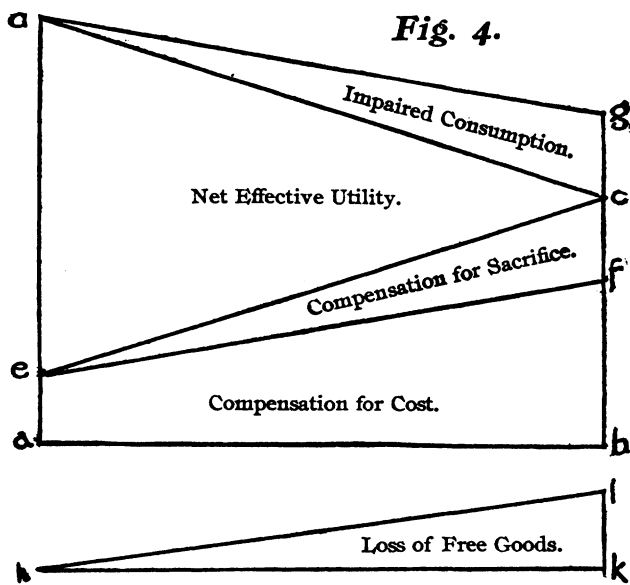


To illustrate the relation of the equilibrium at the margin of production let us modify Figure 2 by supposing that an additional quantity of goods equal to bl is produced. The shortening of the period of consumption would reduce the utility of the goods already produced by the area cdg . The utility of the new goods would be equal to the area $bg hl$, their cost would be equal to the area $b f k l$, and the surplus would be equal to the area $f g h k$. If the point c is at the margin of production the area $g c d$ will be equal to the area $f g h k$. The two surpluses will therefore be equal and it will be a matter of indifference to the producer whether he secures

the one surplus by working or the other by not working. The producer will cease to work at the point *c*, because the effective utility of the opportunity for labor which he is utilizing is at this point reduced to zero. He can add nothing to his welfare by working longer. His surplus, however, in the final act of production is measured not in terms of effective utility, but in those of positive utility. He has a surplus if the pleasure he derives from an article is more than its subjective cost. The comparison is direct between the utility and cost of the article in the mind of its producer and not a relative estimate of the utility of two articles. At the point *c* the producer can secure a surplus (the area *f g h k*) by working or he can secure an equal surplus (the area *c d g*) by a better utilization of what he has already produced. In either way he gets a surplus but neither way adds to his effective utility, because, if he were deprived of one of these surpluses, he could enjoy the other, and hence he would lose nothing in well being. When this point is reached, production ceases, although a surplus measured in terms of positive utility remains.

A variety of possible pleasures, if they are exclusive, always reduces the effective utility of each of them without having any effect on the surplus they afford. If I must chose between a trip to New York and one to Washington, and each of these trips will give me eighty units of pleasure at forty units of cost, neither of these trips will have any effective utility to me, because my welfare does not depend upon the one so long as the other is possible. Shall I, therefore, say that I have no surplus in going to New York because I lose forty units of surplus by not going to Washington, and no surplus in going to Washington because I lose forty units of surplus by not going to New York? If this estimate is correct there can seldom be a surplus. There is always a variety of ways in which to expend our income, and we lose several possible surpluses every time we make a purchase.

In Figure 2 the area efc does not represent a loss to society, but merely a loss to consumer. Because of the interference in consumption this portion of the surplus is taken from consumers and given to producers. What the producers really lose is an area equal to efc not represented in this figure, but which can be fully illustrated by a modification of the figure.



The main facts about Figure 4 being the same as in Figure 2, I need not explain them again. The area dgc represents a utility which might be secured if it were not for the interference in consumption. If there were plenty of time and no interference in consumption, the total utility of the goods enjoyed by society would be the area $abgd$. Producers, however, do not secure the area dgc , because they use so much of their time in production. The net

utility of all the goods is, therefore, the area $a b c d$. Of this latter area $a b f e$ goes to producers as a compensation for their costs. The producer is compensated for the loss of $d c g$ by transferring to him from the consumer that part of the net surplus of society represented by $e f c$.

This transfer of surplus from consumer to producer works itself out in this way. When the producer begins to feel the effect of impaired consumption, he shortens the length of his working day and produces less goods than he otherwise would. The fewer goods to consume raises the marginal utility of goods to consumers, and they will give up more of their income to get these goods. An equilibrium is reached when the reduced production increases the marginal utility of goods to consumers so that a compensation is given to producers for their impaired consumption. The point c represents this equilibrium and the area $e f c$ represents what the consumers must give up to the producers because of the loss of the area $d c g$.

If the loss of the producer is in free goods instead of in impaired consumption, the same effects will follow as those we have just described. Let the area $a b c d$ represent the net utility of the produced goods and the area $h k l$ represent the free goods that are lost because of prolonged production, then the area $e f c$ must be given to producers as a compensation for this loss. The effective utility of goods to consumers would be reduced to zero at the point c , and they would lose an amount equal to the area $e f c$.

The utilities which the producers fail to secure may be both through impaired consumption and the loss of free goods. The area $e f c$ must, therefore, be large enough to compensate for both these losses. The line $b c$ must equal the sum of $c g$ and $l k$. In any case the area $e f c$ is a part of the real surplus enjoyed by society, and hence there is a surplus at the margin of production, although neither producer nor consumer has any effective utility from the last increment of production.

In the last number of the *ANNALS** Professor Clark restates his argument relating to the surplus gains of labor, and uses Table *A* to illustrate the utility, cost and sacrifice of the final period of a day's work. Table *B* contains my estimates of these quantities under the same general conditions.

	<i>A.</i>	<i>B.</i>
Utility of article produced, . . .	$1\frac{1}{2}$	1
Utilities lost by confinement, . . .	$\frac{2}{3}$	$\frac{1}{4}$
Net utility gained by this labor, . . .	$1\frac{1}{6}$	$\frac{3}{4}$
Direct disutility of labor, . . .	$1\frac{1}{4}$	$\frac{1}{2}$
Surplus of gain,	0	$\frac{1}{4}$

The conditions on which these tables are worked out have been carefully stated in the paper referred to, and I shall not restate them in full. It is assumed that the workman is beginning the tenth hour of labor and the problem is to determine at what time under the given conditions he will cease working. Professor Clark thinks he will work twenty minutes after the tenth hour has begun; I think he will work only ten minutes of this hour. The two tables are the result of these estimates. In comparing them it should be remembered that the utility of the product of the first half of a period of work is a little greater than the utility of the second half and that the subjective cost of the first half is a little less than half the cost of the whole period. I estimate therefore, the utility of the product of the first ten minutes of the hour at one unit and its cost at one-half a unit. The loss by confinement will also be much less the first than the last ten minutes. We will call it one-fourth of a unit.

Professor Clark thinks that in this final period of labor three quantities must be considered. The plus quantity is the whole benefit derived from the articles produced during the final period. The two minus quantities are the sum of two sacrifices, one the result of weariness and the other of

* *March*, 1893, p. 79.

confinement. The sum of the two latter will equal the former. I think, however, that there are four quantities to consider—the whole utility of the article produced, the cost of producing it (the result of weariness), the loss through confinement and the compensation for this loss of confinement. The first three items are the same as those of Professor Clark. The fourth item is the point at issue, and its importance demands further illustration.

It is assumed by both Professor Clark and myself that during the first nine hours of labor 21 units of utility were produced at a cost of 6 units. If the man works twenty minutes more as Professor Clark assumes, he has $22\frac{1}{6}$ units of utility at a cost of $7\frac{1}{6}$ units. This twenty minutes is therefore a blank in his life; he merely exists, but makes no net addition to his welfare. If he does not work, however, he can enjoy the utilities which would be lost by working and would thus add $\frac{2}{3}$ units to his welfare without any cost. In this way the twenty minutes would not be a blank, but a source of net pleasure. Again, if he does not work, he has $21\frac{2}{3}$ units of pleasure and 6 units of cost; if he works, he has $22\frac{1}{6}$ units of pleasure and $7\frac{1}{6}$ units of cost, thus adding $\frac{1}{2}$ unit to his pleasures and $1\frac{1}{6}$ units to his costs. The pleasure added by working costs therefore more than twice what it is worth.

At the end of ten minutes' work, as in my table, he has $21\frac{3}{4}$ units of pleasure at the cost of $6\frac{1}{2}$ units; if he does not work, he has $21\frac{1}{4}$ units of pleasure and 6 units of cost. The $\frac{1}{4}$ unit gained represents the utility he would have lost by confinement. He has added by working $\frac{3}{4}$ unit of pleasure at a cost of $\frac{1}{2}$ unit. His net gain by working is therefore $\frac{1}{4}$ unit. This net gain just equals the net gain he would secure during these ten minutes if he had not worked. This is therefore the point of equilibrium. It is a matter of indifference to him whether he works or does not work. The net utility of the day will be the same in either case.*

* See also Figure 3, page 51.

From this illustration the ultimate premise of Professor Clark's reasoning can be seen and contrasted with my premise. He assumes that the laborer works as long as he can get a surplus from his work. I assume that when a laborer can increase his utilities by working or by not working, he will cease working when the increase of his utility by not working equals the net increase obtained by working. The object of economic activity is to increase the net pleasure of living. When a man can get, as in these tables, $15\frac{1}{4}$ units of net utility by working nine hours and ten minutes, he will not work ten more minutes to increase his gross utility, if by so doing he reduced his net utility to 15 units.

Thus far we have measured expense subjectively as it is estimated in the mind of the consumer. He is represented as bartering utilities for utilities, measuring the expense of what he gets by the utility of what he gives. In the modern world, however, acts of barter seldom take place. The consumer sells his goods for money and uses this money to purchase new goods which have a greater effective utility for him. It is necessary, therefore, to translate these terms and ideas of subjective economics into the terms and ideas of commerce.

The real difficulty in this transfer consists in the fact that although subjective values can rise and fall, objective values cannot; they can merely shift, some falling while others rise. While it is easy to trace the effects of a rise or fall in the margin of consumption in terms of subjective values, it is difficult either to trace the effects of this change in objective values or to represent them completely in a diagram. It must also be kept in mind that a rise or fall of subjective values is not accompanied by a rise or fall in prices unless the term "prices" is used in some concrete manner as, for example, wholesale prices or those prices of freely produced goods. It often happens that the term "prices" is used in this narrow sense because the prices of freely produced goods

are readily ascertained, or because it is assumed that other prices stand in some fixed relation to wholesale prices.

In the sense, however, that we can say objective values cannot rise or fall, all the means of increasing utilities must be included whether they are embodied in commodities or not. Services, for example, are a most important means of increasing utilities, and their value must be included in any estimate of total values. The leading contrasts are between services and goods, material* and finished products, present and future goods, and wholesale and retail prices, skilled and unskilled labor, complements in consumption and the isolated articles of which they are composed.

It is impossible that all the requisites of production should be plentiful at the same time. There can, of course, be an absolute increase of all the factors of production at the same time, but the abundance of certain factors means the relative scarcity and high value of others‡. This opposition is especially true between labor and land and between labor and goods. Wages cannot be high unless a day's work will purchase a large quantity of goods. High wages also means a low relative value of land† and an abundance of opportunities to labor—in other words, a high margin of production. If the laborer can choose between many good opportunities to work, labor is relatively scarce and wages will be high. But many good opportunities for each workman to work means efficient production and an abundance of goods at a relatively low value.

The laborer must be paid as much as he can get working to supply his own wants in order to induce him to work for society. A high margin of production both enables and compels society to bid high for the services of its members. A fall in the value of future goods, wholesale prices, raw

* Under material, I include all goods, the high price for which indicates that a high rent is paid for the use of the better means of procuring them. In that complement of goods that we call a home, for example, the value of the building lot may rise and the building material may fall, or the opposite.

† Patten, "Premises of Political Economy," Chap. IV.

material, or isolated articles from which complements are formed, indicates a rise of the margin of production and a relative increase in the value of all kinds of services. Any fall or rise in the value of these products has the opposite effect on wages, and hence a general movement of objective values, up or down, is impossible. The proper investigation will always show a compensation to the consumer for the rise in the value of any class of goods, and a loss to correspond to the gain secured by the fall of any class of goods. The average consumer neither loses nor gains by changes in objective values unless subjective values have also been altered.

Nor can money prices vary unless the conditions for producing the material used as money change. The subjective value of the precious metals is fixed by their use in the arts. When the margin of consumption rises, men use a greater variety of goods and fewer goods of each kind, and thus their marginal utility is increased. The use of gold and silver is affected in the same way as other commodities. Assuming that a ring represents the marginal utility of gold, this ring will have a higher subjective value to a person whose margin of consumption is high than to a person with a lower margin. If we think of money in terms of the subjective value of this ring, it will be seen that changes in subjective values will not change general money prices. If the margin of consumption rises, the consumer estimates each item of the consumer's goods more highly than before, but as the subjective value of his ring has risen to a like degree, it will exchange for the same quantity of other goods as before. The loss of any increment of his goods would be more severely felt after than before the rise of the margin of consumption. In both cases, however, this loss would be measured by the amount of the gold in the ring, and money prices would remain unchanged except as the rise of the margin of consumption altered the relative value of particular classes of goods.

This rise in the margin of consumption will make many changes in the price of particular commodities. Present goods will rise in value and future goods will fall ; services will rise and goods will fall ; finished goods will rise and materials will fall ; retail prices will rise and wholesale prices will fall ; each complement of goods (a house for example) will rise and its isolated elements (the brick, timber, nails, glass, etc.,) will fall. These changes in value will be complicated by the conditions of production, especially by the fact that the increase of some commodities follows the law of constant returns, while the increase of other commodities follows that of increasing or diminishing returns. Other complications will also be created by the conditions determining the distribution of wealth. The added subjective value of present goods will cause a higher subjective value to be imputed to the ultimate factors of production—land, labor, abstinence, intelligence, etc.—and the distribution of this added value among them will depend upon their relative rates of increase. There will, therefore, be many alterations in money prices which will accompany a change in subjective values, but it is a mistake to think that high subjective values would create high money prices (if the price of everything valuable is duly considered).

So long, however, as gold is the standard of value and produced under present conditions, certain changes in prices can be predicted as the result of a rise of subjective values. Gold, or at least the marginal quantities of gold is produced by hand labor. It will therefore have its value affected by whatever affects the value of services (labor). A rise in subjective values increases the value of services and hence, there is a tendency for gold prices to fall with the rise of the margin of consumption. As services rise, retail prices and certain commodities will rise in value from the same cause and other commodities will fall in value both because of the relative rise of the first named goods and because of the general fall of money values. The downward tendencies in

values will be concentrated in wholesale prices of freely produced commodities and in land values or it might in certain cases be concentrated mainly in one of these classes of goods.

This shifting of objective values which accompanies every change in subjective values must be kept in mind when we desire to estimate the consumer's surplus at a given time. The fall in the price of a given commodity does not usually indicate an increase of the consumer's surplus but merely a rise in the value of other commodities in the production of which the ultimate agents in production are employed in different proportions than in the first article. Cheaper goods, for example, means a higher price for the services needed to utilize these goods and thus the consumer loses on the second element of expense what he gained by the fall in value of the first element. His consumer's surplus remains unchanged, or, at least, is much less than it would seem to be if it were measured as Professor Marshall measures it, by the difference between what is actually paid for an article and what would have been paid, rather than to forego its use. Measured in this way, a large part of the surplus which really goes to producers, appears to be a part of the consumer's surplus, thus making the latter fund much larger than it really is.

Professor Marshall, however, does not admit that this method of measuring the consumer's surplus necessitates any duplication of its parts, and thinks that I have not interpreted him correctly.* I regret if I have in any way misunderstood him, and yet, after carefully re-reading the "Principles of Economics," I am still of the opinion that he does not measure consumer's surplus in the way that I do, and that, judged from my standard, he duplicates in many ways the utilities of the goods consumed. To say that his consumer's surplus is larger than mine is the same as to say that the different parts of his consumer's surplus will not, when added, show the true consumer's surplus, because he duplicates the

* ANNALS, March, 1893, p. 90.

same utility in the consumer's surplus of different articles. The illustration that I used was perhaps not fitted to bring out clearly the difference between Professor Marshall's position and mine. He would not, as he has shown, measure the absolute utilities in a way that would count their utility twice. I shall, therefore, leave such extreme cases out of consideration and confine myself to other utilities where our differences are real, though not so striking.

His position can be clearly seen in his illustration concerning the consumer's surplus of coal.* "Let us," he says, "take the case of a man who, if the price of coals were ten pounds a ton, would just be induced to buy one ton annually; who would just be induced to buy two tons if the price were seven pounds, three tons if the price were five pounds, four tons if the price were three pounds, five tons if the price were two pounds, six tons if the price were one pound, ten shillings, and who, the price being actually one pound, does purchase seven tons." He concludes that in this case the economic measure of the consumer's surplus on the first ton is nine pounds, on the second ton, six pounds, and on all seven tons twenty-two and a half pounds.

I do not think that this estimate is correct, and that if all the articles consumed have their consumer's surplus measured in this way there will be many duplications. We will assume that coal is the only article whose quantity changes when its consumer's surplus is estimated. That under these conditions, the consumer is willing to pay ten pounds for one ton of coal does not show that its positive utility is measured by this sum of money. The only direct utility of coal is for heating, and yet if the consumer had only one ton to use during the year, he would not use it in this way. He would doubtless use it for cooking. If he did not cook his food, it would lose much of its utility. He pays the ten pounds to preserve this utility, and not to create new utilities. It is therefore incorrect to estimate the utility of this ton of coal

* Page 182 of the second edition of his "Principles of Economics."

at ten pounds, and also to measure the utility of the food in the same way as before,

If we suppose ten tons of coal, ten barrels of flour, ten pounds of tea, etc., to be the normal supply for a year, I understand that Professor Marshall would estimate the consumer's surplus of each article as follows: Given ten barrels of flour, ten bushels of wheat, etc., what will the consumer give for one ton of coal, two tons, etc. Then to find the consumer's surplus on the flour, he would assume that the consumer had ten tons of coal, ten pounds of tea, etc., and then he would ask what would the consumer give for one barrel of flour under these circumstances, for two barrels, etc. In a similar manner the consumer's surplus of the other articles would be obtained.

With this method of measurement many duplications are unavoidable. The price paid for the first increment of each commodity is only partly due to its positive utility. The price measures the effective utility, a part of which is due to the loss of utility, which other articles would suffer if this increment were lacking.

Suppose that the normal consumption of an individual is composed of five articles of three increments each. If these articles have equal utility and the first increment of each gives five units of pleasure the following table will illustrate the difference between the positive and effective utility of each article :

A	B	C	D	E	
5	5	5	5	5	(7)
4	4	4	4	4	(5)
3	3	3	3	3	(3)

If the quantity of the first four articles remains constant and the quantity of E is reduced, the effective utility of each increment will be shown by the figures in parenthesis. The second increment of E has a positive utility of four units, but its absence will reduce the total utility of the consumer by more than four units, because the utility of the other

articles will be reduced by its absence from complements of goods in which the second increment of E is normally a part. Its effective utility would be at least five units. The absence of the first increment of E would effect the utility of the other articles whose quantities remain unchanged still more seriously, and we can, therefore, estimate its effective utility as seven units.

In a like manner it can be shown that the effective utility of each article is greater than its positive utility as soon as its quantity is reduced below its normal amount. The effective utility of all these articles is seventy-five units. But this measurement is plainly a duplication, for the joint utility of the five articles is sixty units and not seventy-five units. If the consumer's surplus of the five articles is measured by their effective utility it will appear to be fifteen units greater than it actually is.

There is, however, another important objection to measuring the consumer's surplus from the effective utility of commodities measured in price. Future goods have no consumer's surplus. The utility of future goods is imputed to them and depends upon the utility of the present goods, into which they are changed by the process of production. Each portion of bread has a different utility to the consumer. The higher utility of the first portions remains even if a lower price allows the consumption of more bread with a lower utility. There is in this case a true consumer's surplus. When, however, the price of plows is reduced, so that more plows are used, the first plow has no more utility than the second or the last plow. The same utility is imputed to all of them.

If the lower price of plows reduces the price of bread the consumer's surplus on the bread will be increased through the use of additional quantities of bread. This surplus is, however, the only surplus created, and if we assume that there is a consumer's surplus on plows because they have fallen in price, there is a duplication.

Suppose that a plow can produce 1000 bushels of wheat and that the price of wheat would be thirty cents a bushel, if one plow could be had for forty dollars. Then if two plows could be had for thirty dollars each, the price of wheat would be twenty-nine cents a bushel, other expenses remaining the same, and with three plows in use, each costing twenty dollars, the price of wheat would be twenty-eight cents a bushel. There is now apparently a consumer's surplus of thirty dollars on plows, and another of thirty dollars on wheat. The two surpluses are, however, really but one surplus, counted twice. The consumers get only thirty dollars' worth of surplus utility more than before.

That Professor Marshall makes the consumer's surplus much larger than I do, is shown by his illustration involving the purchase of coal (page 182), to which I have already referred. The seven tons of coal cost 7 pounds, and the total utility is estimated at $29\frac{1}{2}$ pounds, thus making the consumer's surplus to be $22\frac{1}{2}$ pounds. The consumer's surplus is more than three times the value. It is probable that the consumer's surplus of most other articles measured in the same way would be as great. There are few articles of which ten increments are desired under ordinary conditions, for which the consumer would not pay ten times as much for the first as for the last increment, if the supply of no other article has been altered.

Instead of making the consumer's surplus three times the value, I should make the value three times the consumer's surplus. The difference in the positive utility of the different increments of most commodities though real is not great. The only exception under normal conditions would be in a primitive society, where a few articles are used to such an extent that the margin of consumption falls almost to zero. Where the variety of consumption is great, only a few increments of each kind are used, and the margin of consumption remains so high that the consumer's surplus is only a small part of the total utility of the commodities consumed.

I have no desire to exaggerate the differences between Professor Marshall's position and my own, yet, where differences arise from different methods of measuring utilities, the legitimate consequences of each method must be made plain. He measures objectively and indirectly what I desire to measure subjectively and directly. Money values merely indicate what we would lose if deprived of a given increment of a commodity but do not analyze the causes why this value is attached to the article. They measure the effective utility of each commodity, but not its positive utility, and hence the former being usually much greater than the latter, the consumer's surplus measured in the first way is much greater than if measured in the second way.

The same causes moreover that lead me to say that Professor Marshall's consumer's surplus is much larger than mine, lead me also to say that the cost of production as he measures it, is larger than I would make it. He measures cost indirectly through expense and not directly as I try to do. He is a firm adherent of the theory that the cost of production under normal conditions determines value, and hence he estimates the cost of each increment by the normal expense of procuring it, where it is the marginal increment. What the consumer would pay to get it under these conditions is made the measure of the subjective cost of its production just as what a consumer will pay for a given increment, rather than go without it, is made the measure of its utility. Both these measures fail for similar reasons. They give us a gross result without any analysis of the separate causes which, in combination, produce this result. Expense equals the reward of labor, and not its cost.

The analysis which I have given elsewhere in this paper shows why this indirect measure of cost is not correct. Many of the elements of expense are not due to any cost which the producer must undergo, but to his favorable position as producer, which enables him to demand a large compensation for the losses which he, as a consumer, bears while

giving his time to production. Any indirect measure of utility and cost through money values must make the cost of producing goods and their consumer's surplus larger than if utility and cost were measured subjectively and directly. On the other hand, the producer's surplus is much larger by the second method of measurement than by the first. The effective utility of the first increments of an article is much greater than their positive utility, while the final increments of an article have usually a higher positive than effective utility. For this reason the effective utility of a marginal increment is reduced to zero, although some positive utility remains.

In the theory of value both cost and utility are measured deductively, the former through the supposed equality of cost and utility at the margin of production, the latter through loss which the absence of an article would inflict upon its consumer. Deductive reasoning is thus substituted for psychological analysis and the difficulties are avoided which the latter method must meet. These psychological difficulties I have tried to solve. Positive and effective utilities are contrasted and the motives are analyzed which make men estimate the loss of an article differently from the gain which its possession secures. Sacrifice is shown to be psychologically different from cost. The one measures the progress society has made in reducing costs; the other measures the obstacles to the increase of utilities which society has yet to overcome. Expense, therefore, which equals the sum of these two cannot be regarded the measure of cost, but differs from it by the amount of the surplus which producers secure at the margin of production because of the interference in their consumption. Effective utility and expense are thus ideas which lie at the basis of the theory of value. Positive utility and cost are equally important in the theory of prosperity.

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